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Canadian Science Advisory Secretariat
Science Advisory Report 2013/055

# ASSESSMENT OF SCALLOPS (*PLACOPECTEN MAGELLANICUS*) IN SCALLOP FISHING AREA (SFA) 29 WEST OF LONGITUDE 65°30'W

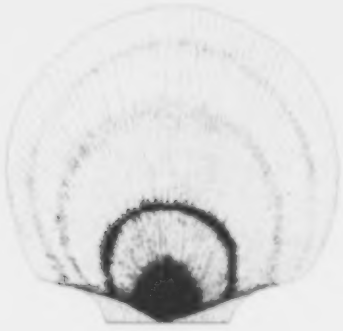


*Figure 1. Location of the portion of Scallop Fishing Area (SFA) 29 west of longitude 65°30'W. Refer to full detail map in Appendix 1 for place names.*

## Context

*Scallop Fishing Area (SFA) 29 encompasses a very large inshore area inside the 12-mile territorial sea, from the south of Yarmouth (latitude 43°40'N) to Cape North in Cape Breton. This report refers to only that portion of SFA 29 west of longitude 65°30'W continuing north to Scallop Fishing Area (SPA) 3 at latitude 43°40'N (Figure 1), hereafter referred to as SFA 29 West.*

*Prior to 1986, the Full Bay Scallop Fleet fished in this area. Following the 1986 inshore/offshore scallop fishing agreement, fishing by the Full Bay Fleet was restricted to north of latitude 43°40'N. A limited fishery by the Full Bay Fleet was granted from 1996–98. Access was again granted to this fleet in 2001 with an at-sea monitoring program and with a condition of a post-season industry-funded survey. SFA 29 West is within Lobster Fishing Area (LFA) 34 and, as a result, scallop fishers consulted with lobster fishers in the area to deal with potential conflicts. Lobster and by-catch of other species continue to be monitored in this fishery. In 2002, Fisheries and Oceans approved access to this area by the Full Bay Fleet and inshore East of Baccaro licence holders who are eligible to fish in SFA 29 West. SFA 29 inshore scallop licenses were historically restricted to East of Baccaro (east of longitude 65°30'W). A joint project agreement was signed with the fishing fleets, Natural Resources Canada, and Fisheries and Oceans Canada, with all parties providing funds to conduct multi-beam acoustic mapping of the seafloor and other scientific work. A map showing bottom features for the entire area has been prepared and was distributed to the fishermen for the 2004 fishery. Work continues on analyzing surficial geology and the spatial distribution of scallops.*

*Advice on Total Allowable Catch (TAC) for this area is based on survey estimates of abundance and commercial catch rates. There are no reference points for the fishery in SFA 29 West at this time.*



Canada

*This Science Advisory Report is from the March 12, 2013, Assessment of SFA 29 West of 65°30' Scallop. Additional publications from this meeting will be posted on the* Fisheries and Oceans Canada (DFO) Science Advisory Schedule *as they become available.*

## SUMMARY


- This scallop fishery has taken place in the portion of Scallop Fishing Area (SFA) 29 west of longitude 65°30' W since 2001 and is currently conducted by two fleets: the Full Bay Fleet and a limited number of inshore East of Baccaro licence holders.
- As of 2010, the Total Allowable Catch (TAC) and landings are reported as totals by subarea for both fleets combined. In 2012, a total of 167.2 t was landed against the TAC of 160 t. There was an additional Food, Social and Ceremonial catch of 4.7 t.
- From 2011 to 2012, catch rates declined or stayed the same in subareas A, C, D and E, but increased by over 40% in subarea B.
- In 2012, there was an increase in the mean number of commercial scallops in the survey for subareas A, B, and D, and no change in C. The number of recruit size scallops per tow increased in subareas A, B, and C, but did not change in D. Pre-recruits showed an increase in all subareas. The mean weight per tow and survey biomass for commercial size scallops increased in subareas A to D from 2011 to 2012.
- Condition factors increased in subareas A to D, but the increase was less dramatic in subarea D. Some of the highest growth rates for SFA 29 West were observed in 2012, particularly in subarea B.
- Two methods were used to estimate exploitation rates in SFA 29 West: one from commercial catch rates (depletion model), representing more localized conditions, and one from the research survey (survey model), which represents broader conditions. Trends in annual total fishing effort (hours fished) were also presented since effort is directly related to fishing mortality.
- From 2011 to 2012, effort decreased in subareas A and D by 94 and 48%, respectively, while smaller decreases in effort were recorded for subareas B (10%) and C (12%). Exploitation estimates generally indicated a decrease in all subareas in 2012.
- A total TAC similar to that in 2012 is recommended. A reduction in TAC in subarea C would promote recovery of this area, and an increase in TAC in subarea B would be consistent with the observed increase in abundance and biomass in this area.
- The estimated number of lobster caught represents 0.01% of the lobsters caught in the 2011/2012 Lobster Fishing Area (LFA) 34 lobster fishery and 0.05% of the lobsters caught in the area of LFA 34 corresponding to SFA 29 West. In 2012, it is estimated that 4,302 lobsters were caught during the SFA 29 West scallop fishery; 940 were dead or injured.


## BACKGROUND

### Rationale for Assessment

As part of the Regional Science Advisory Process, a meeting was held on March 12, 2013, at the Bedford Institute of Oceanography in Dartmouth, Nova Scotia to review the 2012 scallop fishery and assess the status of the scallop stock in Scallop Fishing Area (SFA) 29 West in support of the management of the 2013 fishery. Specifically, the meeting was called to provide science advice for the SFA 29 West scallop fishery by subarea using analyses of catch rate and survey biomass trends. In addition, an assessment of the lobster bycatch was also provided.

# ASSESSMENT

## Fishery

This scallop fishery has taken place in the portion of Scallop Fishing Area (SFA) 29 west of longitude 65°30'W since 2001 and is currently conducted by two fleets: the Full Bay (FB) Fleet and a limited number of inshore East of Baccaro (EoB) licence holders. Starting in 2002, the total allowable catch (TAC) was shared between the FB fleet and EoB licence holders who were eligible to fish in SFA 29 West. As of 2010, the TAC and landings are reported as totals by subarea for both fleets combined. In 2012, a total of 167.2 t was landed against the TAC of 160 t (Table 1; Figure 2). There was an additional Food, Social and Ceremonial catch of 4.7 t.

*Table 1. Scallop landings (meats, t) and TACs for subareas of SFA 29 West in 2012. Table includes Food, Social, and Ceremonial (FSC) catch, which is added to the total landings but does not count against the TAC. The TAC is shared between subareas A and E.*

| | *Fleets Combined* | | *First Nations* | |
|---|---|---|---|---|
| Subarea | TAC (t) | Landings (t) | FSC | Total Landings (t) |
| A | 25.0 | 1.02 | | 1.0 |
| E | | 17.9 | | 18.0 |
| B | 60.0 | 76.8[1] | 4.2 | 81 |
| C | 45.0 | 39.8 | 0.03 | 39.8 |
| D | 30.0 | 31.7[2] | 0.4 | 32.1 |
| Total | 160.0 | 167.2 | 4.7 | 171.9 |

1. Includes 5.2 t landed during August 30th to September 15th re-opening.
2. Includes 1.1 t landed during August 30th to September 15th re-opening.

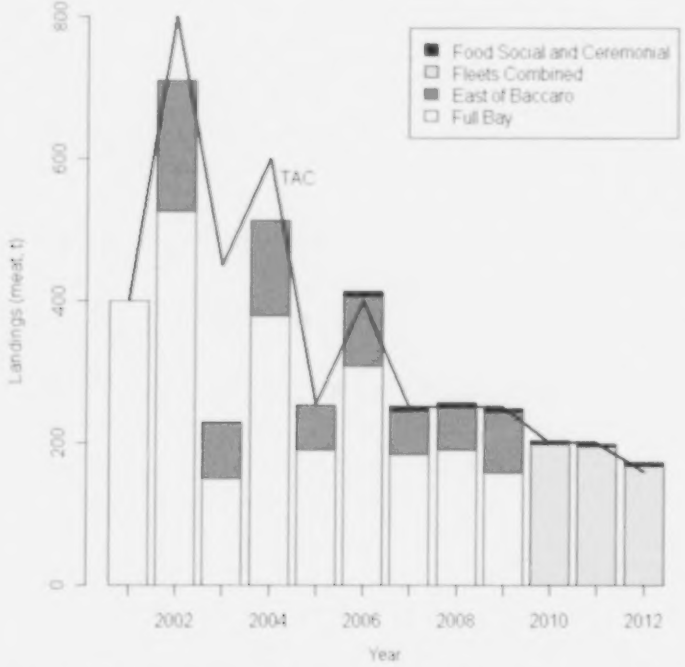



*Figure 2. Annual scallop landings (meats, t) by fleet, which count against the TAC, landings for Food, Social, and Ceremonial purposes, which do not count against the TAC, and total TAC for SFA 29 West.*

The scallop fishery in SFA 29 West occurred in 5 subareas (A-E, Appendix 1). All subareas opened for the 2012 fishing season on June 25th. Subareas B and D were closed on July 9th and July 10th, respectively, as the quota had been caught or exceeded in those two subareas. The remaining areas were closed on August 6th. This closure left a number of fishermen with uncaught quota and the Minister directed the fishery to re-open from August 30th to September 15th to allow those fishermen with uncaught quota to catch up to 75% of their remaining share. All subareas were available to be fished for the re-opening. There were no closed areas in 2012 as a result of lobster bycatch.

From 2011 to 2012, catch rates in subarea A declined by 14% and 39% for Full Bay and East of Baccaro fleets, respectively (Figure 3). The greatest increases in catch rates were in subarea B where catch rates increased by over 40% for both fleets. There was no change in catch rate for either fleet in subarea C. In 2012, the FB fleet catch rate in subarea D did not change, while the EoB catch rate declined by 16%. The catch rate for FB in subarea E increased by 34% from 2011 to 2012. In contrast, the EoB catch rate in this subarea decreased 14% from 2011 to 2012.

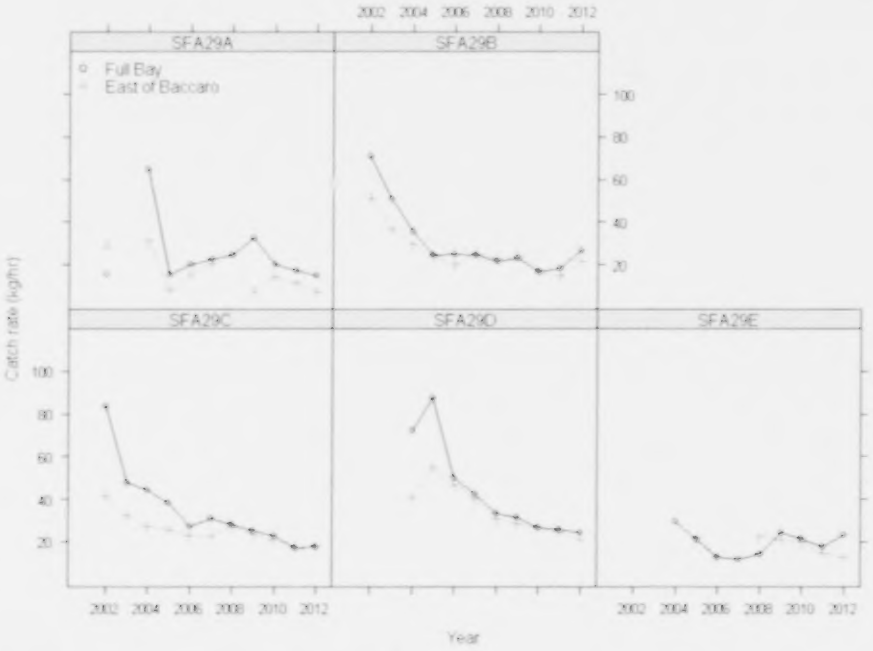



*Figure 3. Annual trends in average commercial catch rate (kg/h) for the SFA 29 West scallop fishery for each subarea by fleet.*

## Survey

A post-season joint industry/departmental research survey has been conducted annually since 2001 when the current fishery started. The survey design was initially a simple random design over the whole area. From 2002 to 2004, a stratified random design was used with strata defined by the management subareas A to E. Starting in 2005, strata were defined by bottom type as identified by geologists as part of the joint industry/government multibeam mapping project conducted in this area. A new interpretation of the bottom types was made available in 2008 and was used to design the surveys for 2008 through 2011. Survey estimates from 2001 to 2007 have been modified to correspond to this new design. Subarea E is considered to be marginal habitat for scallops and, as a result, has been less of a survey priority. In 2012, five tows were allocated to subarea E.

Time trends for the abundance (number per tow) of commercial (≥100 mm shell height) and recruit size (90-99 mm shell height) scallops are plotted in Figure 4. In 2012, there was an increase in the mean number of commercial scallops in the survey for subareas A, B, and D, and no change in C. The number of recruit scallops per tow increased in subareas A, B, and C, but did not change in D. The largest increase in numbers per tow was seen in subarea B where the numbers of commercial scallop almost tripled from 2011 values. The mean weight per tow and survey biomass for commercial size scallops increased in subareas A to D from 2011 to 2012. Only five tows were completed in subarea E, but mean numbers and weights observed there were comparable to other subareas.

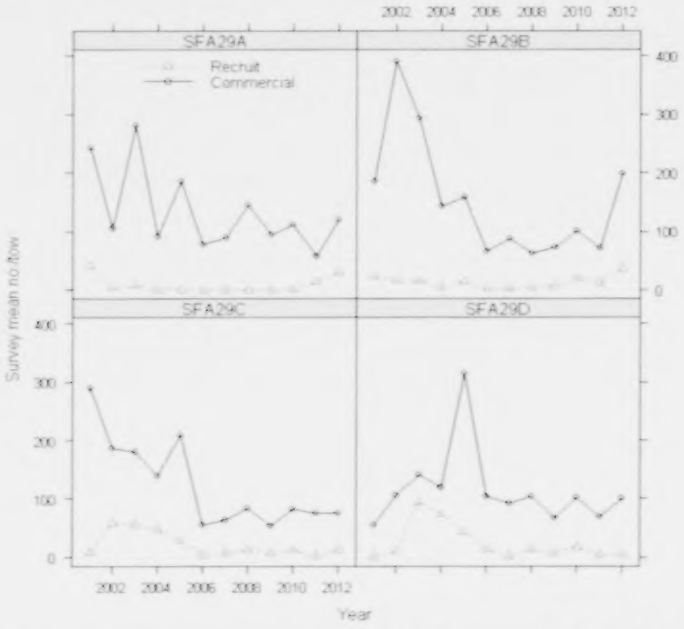



*Figure 4. Annual trends in estimated mean number per tow of commercial (≥ 100 mm) and recruit (90-99 mm) size classes from research surveys by subarea in SFA 29 West. Commercial and recruit series estimated from fishing vessel (F/V) Julie Ann Joan (2001–2003, 2005–2011),F/V Branntelle (2004), F/V Overton Bay (2005), F/V Faith Alone (2006–2011) and F/V Hit 'N' Miss (2012). Geophysical strata used for design.*

Condition factor was calculated from shell height and meat weight data collected on the survey. The annual component of this model indicates that condition has increased in the last year over all of SFA 29 West. Condition factors increased in subareas A to D, but the increase was less dramatic in subarea D. The average condition factor increased from 9.88 g/dm$^3$ and 10.70 g/dm$^3$ in 2011 to 12.38 g/dm$^3$ and 13.65 g/dm$^3$ in 2012 for subareas B and C, respectively. Some of the highest growth rates for SFA 29 West were observed in 2012, particularly in subarea B.

## Exploitation Rate Estimates

Two methods were used to estimate exploitation rates in SFA 29 West: one from commercial catch rates (depletion model), representing more localized conditions, and one from the research survey (survey model), which represents broader conditions. Trends in annual total fishing effort (hours fished) were also presented since effort is directly related to fishing mortality (Figure 5).

The fishery in subarea A has been sporadic over time and, for some years including 2012, was only fished for a few days. There is, therefore, limited fishery data from which to construct depletion estimates. This lack of data produced results with a very high degree of uncertainty and the results are not presented here.

Effort decreased in subareas A and D by 94 and 48%, respectively, and the exploitation estimates indicated concurrent decreases in exploitation in these two areas (Figure 5). Smaller decreases in effort were recorded for subareas B (10%) and C (12%). In subarea B, the survey estimates indicated a 19% decrease in exploitation, while the depletion-based estimates in 2012 increased from 2011. In subarea C, the depletion estimates indicated a slight decline, while the survey estimates indicated a slight increase in exploitation from 2011.

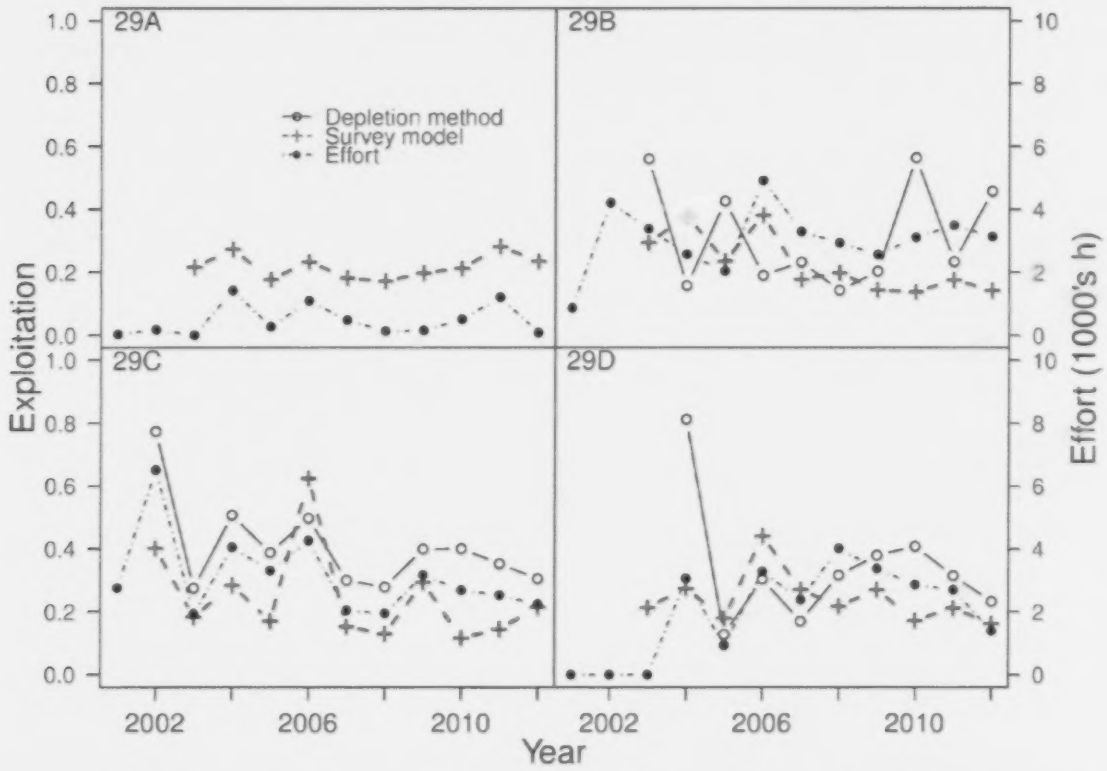



*Figure 5. Comparison of exploitation estimates from the depletion method, survey biomass model, and the total annual fishing effort for commercial size scallops in SFA 29 West, subareas A, B, C, and D. Note that reliable estimates of exploitation for subarea A were not obtained from the depletion method.*

## Lobster Considerations

The mean number of lobster per tow in the survey increased from 2011 to 2012 in subareas A-D. The greatest increase was in subarea D, which had 0.34 lobster per tow in 2011 and 2.9 in 2012. Subarea B had the greatest number of lobster per tow in 2012 at 8.3.

In 2012, there were 973 observed tows (460 EoB and 513 FB), 33 days observed (16 EoB and 17 FB) and 10 trips observed (4 EoB and 6 FB). As in previous years, most lobsters caught during the observed fishing trips were in subarea B, closely followed by area C. There were no lobsters observed in the two observed trips in subarea D in 2012 (Figure 6).

The estimated number of lobster caught represents 0.01% of the lobsters caught in the 2011/2012 Lobster Fishing Area (LFA) 34 lobster fishery and 0.05% of the lobsters caught in the area of LFA 34 corresponding to SFA 29. In 2012, it is estimated that 4,302 lobsters were caught during the SFA 29 scallop fishery; 940 were dead or injured. The total weight of the captured lobsters in 2012 was approximately 2.8 t (assuming an average carapace length of 91 mm and average weight of 0.64 kg).

Trends in lobster catches by the lobster fishery in the SFA 29 West area as a whole are indicative of an area that has not been adversely affected by the scallop fishery since 2001.

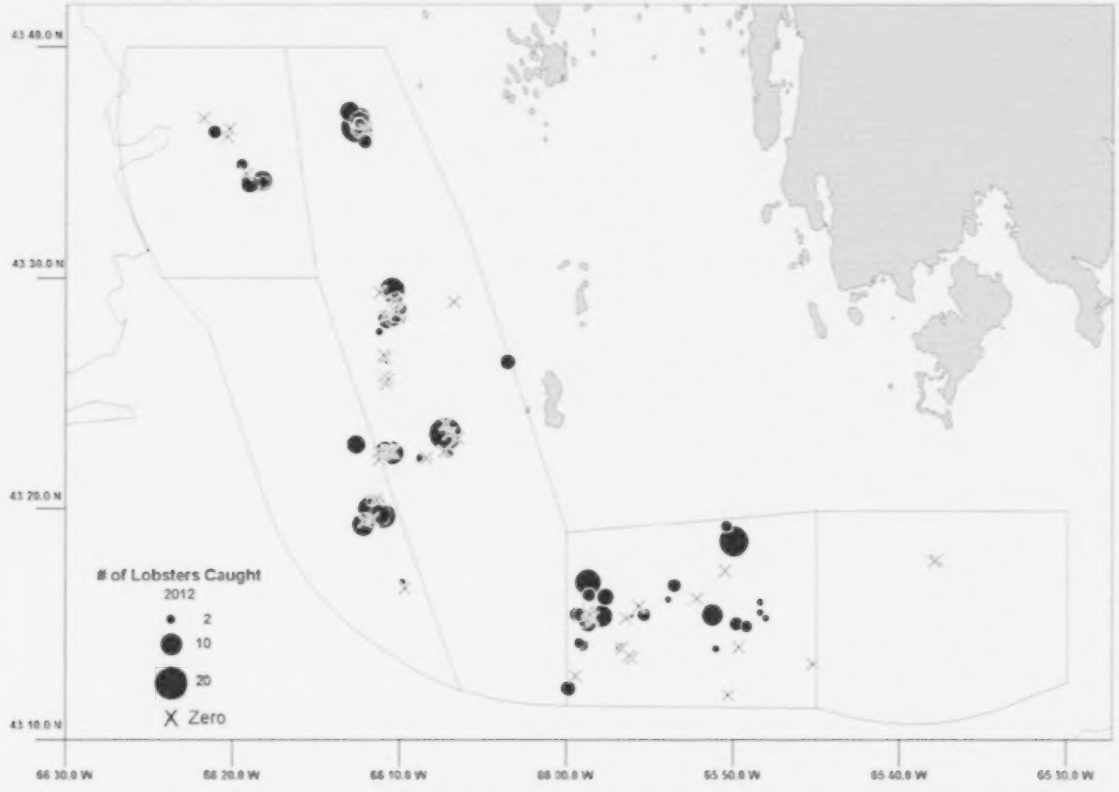



*Figure 6. Location and number of lobsters caught in SFA 29 West in 2012 from observed scallop fishing trips. Crosses indicate locations where no lobsters were captured.*

## Sources of Uncertainty

The assumptions required for the depletion model analysis of no recruitment, natural mortality, equal vulnerability of commercial size scallops to the fishing gear, and minimal growth during the fishing season have not been verified.

Exploitation rate estimates from the survey model assume that survey biomass was proportional to population biomass.

Advice on expected impacts of the 2013 fishery was based on the assumption that somatic growth in 2013 will be similar to that observed in 2012. Somatic growth rates in 2013 are difficult to predict due to high annual variability.

## CONCLUSION AND ADVICE

Last year's TAC advice recommended reducing total fishing effort in each subarea in an attempt to lower exploitation and, in turn, promote increases in biomass. In 2012, effort decreased in subareas A and D by 94 and 48%, respectively. The decreases in effort for subareas B and C were more modest at 10 and 12%, respectively. From 2011 to 2012, catch rates declined or stayed the same in subareas A, C, D and E, but increased by over 40% in subarea B. In 2012, there was an increase in the mean number of commercial scallops in the survey for subareas A, B, and D, and no change in C, and mean weight per tow increased in subareas A-D. Both survey number per tow and weight per tow exhibited the highest increases in subarea B. Growth and condition showed the largest increases in subareas B and C; the increase was less dramatic in subarea D. Exploitation estimates generally indicated a decrease in all subareas in 2012.

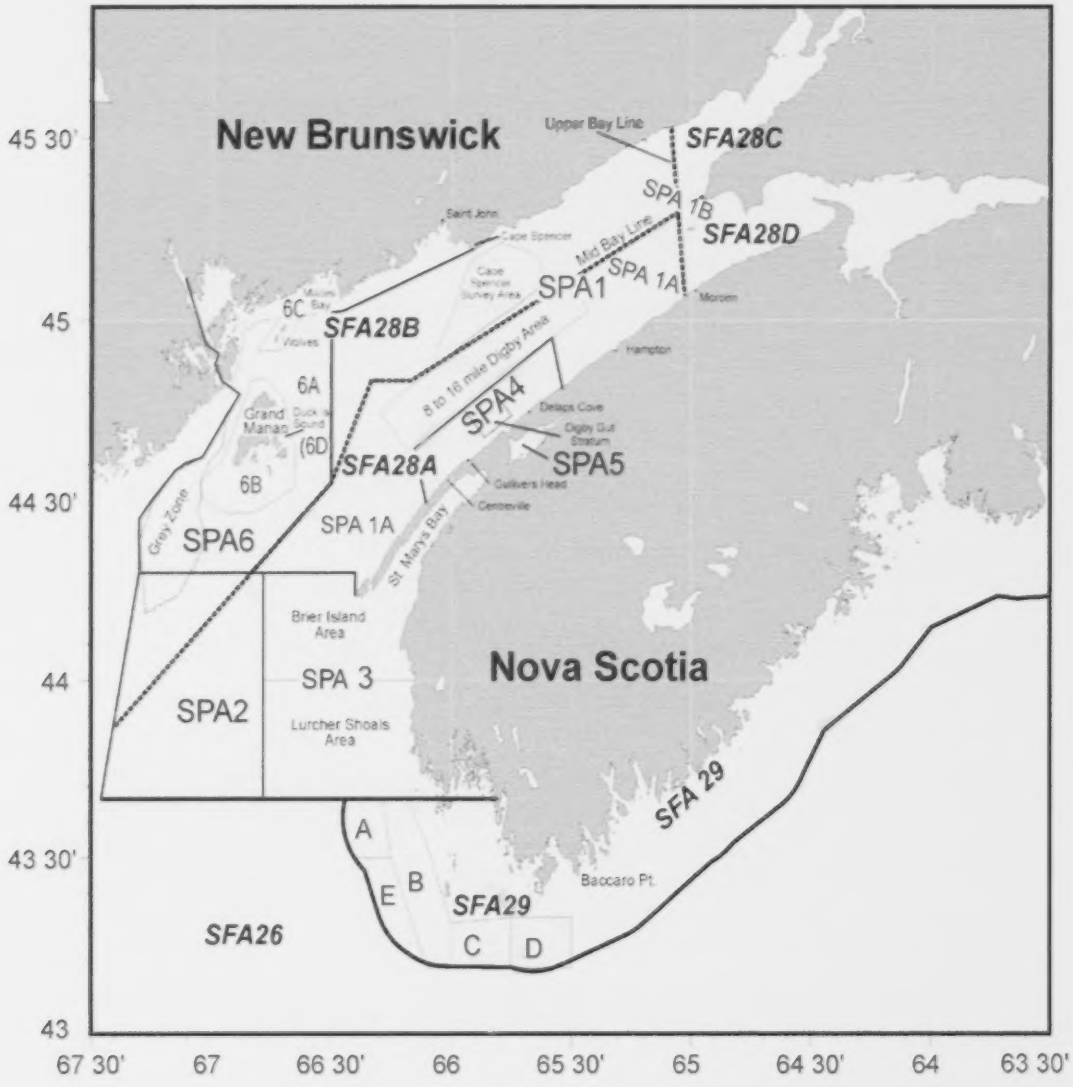
With the exception of subarea C, all areas exhibited increases in mean numbers and mean weight per tow from the survey, possibly as a response to the decrease in effort, keeping in mind that the concurrent increase in growth and condition are also factors in the increase in mean weight. Past experience indicates that both growth and condition trends are highly variable in SFA 29 West, and there is no way of predicting what growth will be in 2013. All areas exhibited increased numbers of pre-recruit scallops in the 2012 survey, offering a potential for improved prospects in two to three years. A total TAC similar to that in 2012 is recommended. A reduction in TAC in subarea C would promote recovery of this area, and an increase in TAC in subarea B would be consistent with the observed increase in abundance and biomass in this area.

## SOURCES OF INFORMATION

This Science Advisory Report is from the March 12, 2013, Assessment of SFA 29 West of 65°30' Scallop. Additional publications from this meeting will be posted on the Fisheries and Oceans Canada (DFO) Science Advisory Schedule as they become available.

## APPENDICES

*Appendix 1. Locations and place names for inshore Scallop Fishing Areas (SFAs) and Scallop Production Areas (SPAs).*



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